InDOG

First InDOG Doctoral Conference

Proceedings of Abstracts

October 29-31, 2012

Olomouc

DEPARTMENT OF GEOINFORMATICS
Palacký University in Olomouc

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The first InDOG doctoral conference in Olomouc is a part of the project led by the Department of Geoinformatics, Faculty of Science, Palacký University in Olomouc. The conference is now convened and the next is planned in 2013.

The InDOG doctoral conference is unique. Doctoral students who are in the process of completing their theses are invited to submit papers for presentation to a group of academics with special expertise in the topics they are assigned.

The conference aims to provide the students with an assessment of their presentational skills and a constructive critique of their research by a group of peers and senior academics. It is also an opportunity to access a wider academic network and the postgraduate job market.

The conference is made possible each year by the support of the Dept. of Geoinfomatics and the public and business sectors.

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Abstracts of presentations

Olomouc: A university city

Olomouc has always been among the most prominent medieval cities of the Czech lands. For centuries, its good geographical location, its university with a long tradition, its culture and crafts have made it a natural centre of Moravia, attractive to artists, intellectuals and merchants alike. Nowadays, Olomouc is the main city of the Olomouc Region and has over 100,000 inhabitants, which makes it the fifth biggest city in the Czech Republic. After Prague it is the second biggest historical area in the country, with its old university, Archbishopric, Moravian Philharmony, many interesting museums and theatres, vast parks and a zoo.
Olomouc has been known as a university city for centuries. It is a city full of young people that offers cultural and sports events and life in an attractive region with a low cost of living.

Palacký University in Olomouc

The Czech Republic offers a wide and varied choice of colleges and universities. If you look for high quality teachers, a wide range of study programmes, a stable scientific research base or renowned experts, you do not have to go far. In the historic atmosphere of the city of Olomouc you will find Palacký University – clearly the best choice, not only for students, but also for foreign guests, top researchers and prominent institutions and companies.

The Palacký University draws on a long tradition. It was founded in the 16th century and is the second oldest university in the Czech Republic. It has become a modern educational institution that offers a wide range of study programmes and engages in a variety of research activities. Its eight faculties are attended by 23,000 students – more than a fifth of the city's number of inhabitants. Its prestige among other universities has been repeatedly confirmed by the keen interest, not only of young applicants, but also of a high number of professionals. The demand has been so high that it far exceeds the capacity of our study programmes.

Palacký University is a research university. Promotion and development of science and research stand at the heart of its priorities. Research teams as well as students working on varied research projects can count on state-of-the-art technology. Thanks to the university projects the city has, in recent years acquired new research centres of national and international importance. Modern laboratories and other research possibilities provided by these centres make them attractive for researchers and universities from abroad.

Department of Geoinformatics

The Department of Geoinformatics was founded in 2001. The roots of geoinformatics at Palacký University can be traced back to 1989, to the Department of Geography. Nowadays, the Department of Geoinformatics is a separate academic department that offers high quality education and research.

It is renowned both nationally and internationally. The main fields are geoinformatics and geoinformation technologies in education and research, and their promotion, both in the Czech Republic and abroad. Its activities encompass teaching in the field of geoinformatics with special emphasis on geographical aspects, research projects that follow international trends and the promotion of modern geoinformation technologies in all spheres of Czech society.

The Department owns two specialised laboratories for geoinformation systems and remote sensing and one research laboratory for the eye-tracking technique in cartography. It uses state-of-the-art equipment and software. Its teaching activities are accompanied by cooperation with prominent national commercial companies in the field as well as renowned foreign universities.

The teachers do their best to react to the individual needs of students of bachelor, master and doctoral programmes, enabling them to take part in research projects, to work and gain experience in commercial companies and to excel in national specialised student contests.

PhD course in Geoinformatics & Cartography

Since the establishment of PhD course in Geoinformatics & Cartography at Palacky University in Olomouc in 2004 the department has focused thesis, publications and other activities of PhD students on three research fields:

Spatial modelling of geographical phenomena in GIS

- modelling of natural phenomena – statistical modelling of hazards (landslides, floods, fires, destructive winds, wind breakages)
- modelling of urbanization processes – suburbanization, urbanization, urban growth, regional development scenarios, spatial structure of cities
- geostatistics in transport – research, processing and analysis of data from traffic census and monitoring, analysis of data from automatic data collection from the transport network, etc.
- environmental statistics – statistical analysis of records or field research data
- analysis of surveys – socioeconomic surveys, selective surveys and analysis of categorical data

Digital cartography

- production of thematic atlases
- synthetic map-making and map-use
- usability evaluation of map reading
- geovisualization on the web

Remote monitoring of landscape

- small format landscape photography with visible and near infrared spectral resolution (using the DRONE PIXY paraglider model)
- continuous monitoring of abiotic factors using sensor networks, telemetry stations and single- or multi-function data loggers,
- identification and analysis of landscape structure with the use of GIT
- creation and analysis of records

Scientific Council of the study Geoinformatics & Cartography

prof. dr. Vít Voženílek – Palacký University, Olomouc
- Geovisualization in geoinformation technologies
- Modelling and simulation of spatial phenomena

prof. dr. Václav Snášel – Technical University of Ostrava
- Document-grafical information systems
- Data compression

assoc. prof. dr. Jaromír Kaňok – Palacký University, Olomouc
- Cartographical sémiology
- Cartographical research methods

assoc. prof. dr. Jiří Dvorský – Palacký University, Olomouc
- Object-oriented technologies

prof. dr. dr. hab. Jan Andres – Palacký University, Olomouc
- Mathematical modelling of dynamic systems

prof. dr. Radomír Halaš – Palacký University, Olomouc
- Geometry of spatial phenomenon description

assoc. prof. dr. Lenka Motyčková – Palacký University, Olomouc
- Theoretical fundaments of computer networks

assoc. prof. dr. Jana Talašová – Palacký University, Olomouc
- Fuzzy sets and their applications

prof. dr. Bohuslav Veverka – Czech Technical University in Prague
- Digital cartography
- Topographical mapping

prof. dr. Ján Tuček – Technical University in Zvolen (Slovakia)
- Decision spatial support systems

prof. dr. Milan Konečný – Masaryk University, Brno
- National spatial data infrastructures

assoc. prof. dr. Jaromír Kolejka – Masaryk University, Brno
- Geoinformatic methods of remote monitoring of landscape
- GI technologies in environment management

assoc. prof. dr. Ján Feranec – Slovak Academy of Science, Bratislava (Slovakia)

- Mapping of landscape and its changes by Earth remote sensing

assoc. prof. dr. Jakub Langhammer – Charles University in Prague

- Flood risk modelling

assoc. prof. dr. Jiří Horák – Technical University of Ostrava

- Spatial data analyses
- Planning and design in GI technologies

assoc. prof. dr. Jan Kolář – Charles University in Prague

- Theory, analysis and interpretation of radar data

prof. dr. Jaroslav Hofierka – University of Prešov in Prešov (Slovakia)

- Programming for open-source GIS

Jonathan F. Raper

Professor Jonathan F. Raper joined the City University in London in 1999 as Professor of GIS and was Head of the Department from 2003-2006. He founded the geographic information centre ("giCentre at City") in 1999, which is now one of the UK's premier centres of expertise in geographic information, geovisualisation and location based services (LBS) research. He is known internationally for his work on GIS, spatial data and LBS, having published around 150 research articles and seven books in these fields, and supervised a dozen completed PhDs. He has served on the Scientific Committees of GIScience, COSIT, SDH, GISRUK and LBS & Telecarto conferences and chaired European Science Foundation conferences on spatial multimedia and 3D GIS. He was awarded the Royal Geographical Society Gill Memorial Award for research in GIS in 1995 and the Kitchin Award by the Saddlers Company for significant contributions to City University in 2008. Jonathan's main research work in the last decade has been the design, development and implications of location-based services and studies.

Jonathan Raper is now CEO of the data-as-a-service company Placr Ltd. and Visiting Professor at City University London. Placr aggregates open data in transport, offering added-value data feeds through http://www.transportapi.com/ and apps such as Busmapper or UK TravelOptions. Jonathan is on the Mayor of London's Digital Advisory Board, the UK Ministry of Transport Transparency Board and the Information & Communication Technologies Knowledge Transfer Network Advisory board.

Research challenges and opportunities in open transport data

Across the world public and private transport operators are releasing their timetables, stops, routes and live departure data for research and commercial use. In the UK the entire national transport infrastructure is now in the public domain, distributed through scalable platforms and updated in real time. This data offers unprecented opportunities for research into travel demand, journey planning, accessibility, service performance and farepricing. This presentation will outline how Placr have been aggregating, analysing and publishing these data streams and some of the uses the data has been put to in apps and web services. Some of the key research challenges and opportunities in open transport data will be outlined.

Jan Brus

Jan Brus is a PhD student and researcher at the Department of Geoinformtics at Palacký University in Olomouc. His professional skills are cartography, visualisations and environmental geoinformatics. His research is focused on uncertainty visualisations, cognitive aspects, perception and eye-tracking. He completed several short-term research internships in Norway, Iceland and Finland during his Ph.D. studies. He is a member of the ICA Commission on Cognitive Visualization and a member of the Czech Cartography Society. His PhD thesis deals with the uncertainty visualisations in environmental studies.

Detection and Visualisations of Ecotones - Landscape Pattern under Uncertainty

Ecotones are a significant part of almost every landscape structure and have a significant effect on the distribution of species. Spatial variability of ecotones has resulted in advanced modelling, analysis and visualization of these landscape forms. Their spatial variability and fuzzy character are causing uncertain and problematic handling in GIScience. The uncertainty of ecotones in the landscape arises from many sources, including complexities inherent in ecosystems and their disturbance processes. However, gaining knowledge about ecosystems at the landscape level is often impeded by limitations in collecting comprehensive, representative, as well as accurate data sets. The investigation into ecotones enables a better understanding of the causal relationships between certain landscape elements and landscape utilization categories. Visualization of spatial uncertainty is still a challenging topic for the cartographical community with many unsolved research questions. The presentation explores the possible visualization methods for portrayal ecotones based on detection, description and analysis of the geographic boundaries of the Trkmanka river catchment with regard to cartographical rules and cognitive aspects.

Alžběta Brychtová

Alžběta Brychtová is a PhD student at Palacký University in Olomouc. Her professional skills and interests in cartography are cognitive aspects, usability studies and eye-tracking, which are fully reflected in her dissertation thesis on the evaluation of map complexity and graphic content. She completed a short-term research internship at ETH Zurich in 2012. She is a member of ICA Commission on Cognitive Visualization and a member of the Czech Cartography Society.

Visual distance of map symbols: evaluation of map readability with eye-tracking

The presentation is aimed at visual distance of map symbol quantification and evaluation. The basic assumption is that the visual variable variations have an influence on the ability of users to read information from maps.

The author describes the results of the recent case study which was focused on the influence of colour distance on the legibility of the map. The research is based on eye-tracking experiments determining whether the independent variable (colour distance of map symbol) has an influence on the change of the measured eye-tracking metrics and whether it affects the ability of map readers to find the desired information. The experiment was designed as a set of image stimuli. The experiment participants were asked to read a question and to mark the correct answer on the map. The resulting eye-tracking metrics (the number and duration of fixations and saccades) were evaluated by methods of descriptive statistics and hypotheses testing. The research partially proved that increasing colour distance has an influence on increasing the ability of users to read the map information.

Jan Caha

Jan Caha is a PhD student at Palacký University in Olomouc. His interests and skills are Java programming language, Open source technologies, GIS and Fuzzy theory. The main aim of his dissertation is the management of uncertainty in surface analysis by means of fuzzy theory.

Comparison of Fuzzy Arithmetic and Stochastic Simulation for Uncertainty Propagation in Slope Analysis

The Stochastic simulation is the most used method for uncertainty propagation in surface analysis, but with limitations and properties that might bring problems for suitable use of the results. Fuzzy arithmetic overcomes some of these problems and offers another possible approach to the given problem. The presentation describes a comparison of the above-mentioned methods considering two aspects – computational performance and ability to include extreme cases in the result of the analysis. Two model examples are presented. The first example is an analysis of the slope of one pixel where the differences in obtained results are described. The second case shows an analysis of a whole grid (simulated dataset) and compares computational and memory requirements for Fuzzy Arithmetic and Stochastic Simulation. The result is a comparison of both methods with the focus on computational performance and the suitability of the results for further decision making based on the analyses‘ outcome.The advantages of fuzzy arithmetic over stochastic simulation can be summarized as smaller computational demands as well as an ability to guarantee the inclusion of the extreme cases in the result of the analysis.

Barbora Hladišová

Barbora Hladišová is a PhD student at Palacký University, Olomouc. Her professional skills and interests in cartography are dynamic cartography, dynamic cartographic symbols and dynamic atlases. Her dissertation thesis is on the compilation of dynamic atlases. She completed a short-term research internship at Brighton University in 2012.

Dynamic Cartographic Symbols

In the last few decades, developments in cartography have moved towards the digital processing of both spatial data and the cartographic symbols representing them. The presentation deals with different approaches of cartographers to the dynamic of the phenomena and the dynamic cartographic symbols. The parameters of the dynamic cartographic symbols and their usage in cartography as they are perceived by various word cartographers is discussed. As there are many cartographers dealing with this topic, there are also many views. In this paper, there will be an outline and comparison of these views as well as Barbora's own perception of the topic. At the end there will be some examples of the usage of dynamic cartographic symbols in worldwide cartography.

Zbyněk Janoška

Zbyněk Janoška is a PhD student at Palacky University in Olomouc and is currently employed as a GIS analyst for the Transport Research Centre. His research focuses on spatial data analysis in transportation studies, mainly on spatial clustering and road accident black spot identification. In his thesis he develops innovative applications of P systems in transportation modelling and simulation.

P Systems for Passenger Flow Simulation

P systems are computing devices inspired by the structure and functioning of a living cell. P systems consist of a hierarchy of membranes and multisets of objects and rules, from which they evolve. The presentation introduces a P system based model for passenger flow simulation in public transportation networks. A formal description of the model is given and results on experimental data are shown. The presented model exhibits sensitivity to initial configuration and shows cyclic behaviour. Its advantageous features include straightforwardness, simplicity and expressiveness.

Lukáš Marek

Lukáš Marek is a Ph.D. candidate of Geoinformatics & Cartography at the Department of Geoinformatics, Palacky University in Olomouc. His scientific interests mainly cover the areas of spatial analyses and modelling, geostatistics, spatial statistics and the application of statistical methods on spatial data. His dissertation thesis is aimed at the applications of the above-mentioned methods in health data. He has completed short-term research internships in Trondheim, Beograd and Kraków. Besides his research activities, he is co-founder and editor of the web based journal GISportal.cz.

Spatial Patterns of Epidemiological Data: Case study in the Olomouc Region, Czech Republic

The contribution aims to present spatial analyses and practical usage of methods of spatial statistics and clustering of health occurrence data of selected infectious diseases in the Olomouc Region in 2004-2010. Firstly, spatial clustering and randomness estimation were applied on a real dataset. Then spatial clusters were identified and the intensity of processes was quantified. In addition, the methods of multivariate statistics, where non-spatial properties and time, as well as the location data were considered, and were used for the purpose of classification of regions with similar properties. The performed analyses show that the occurrence of most infectious diseases is not random, but the presence of spatial clusters is evident. Multivariate statistics were applied to categorize the individual areas according to the susceptibility of the selected diseases.

Miloš Marjanović

Miloš Marjanović is a PhD student at Palacký University in Olomouc. His interests are Spatial Modelling, Remote Sensing, Machine Learning, and particularly Natural Hazards and their prediction. His PhD thesis reflects the aforementioned (aforementioned is one word) interests by implementing advanced techniques for assessing landslide hazards. He has taken part in several courses and internships related to the scope of his research. His work has been published in various conference proceedings and prominent journals in the field.

Advanced Landslide Assessment of the Halenkovice Experimental Site

The presentation concentrates on one of the case studies included in the PhD thesis “Advanced methods for landslide assessment using GIS”. The study area is located in the vicinity of Halenkovice in the Czech Republic, an area known for its recent landslide activity related to the heavy rainfall/snow thaw. The study follows the methodology elaborated in some of the author’s earlier research, and primarily involves machine learning techniques. The latter includes some of the state-of-the-art classifiers as well as some common ones. Namely, several experiments have been done by implementing Support Vector Machines, Logistic Regression and Decision Tree algorithms. Their task was to recognize (learn) landslide versus non-landslide instances across one part of the area by using attribute data sets and expert’s reference, and to make a prediction for the other part of the area where only the attribute data were available, while the expert’s reference was (hypothetically) unavailable. Attribute datasets consisted of certain thematic layers: slope, aspect, slope length, geometric form of relief, land use and geological map. Each classifier resulted in a landslide susceptibility map. The maps/models were then compared and discussed. The case study area has been subject to a similar research framework by other authors and involved in CGS (Czech Geological Survey) research projects. Thus this research represents a logical extension and contribution to the related problematic.

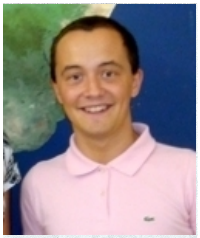
Jakub Miřijovský

Jakub Miřijovský is an assistant in the department of Geoinformatics at Palacký University in Olomouc and also a student of the Ph.D. course Geography & Geoinformatics. He specializes in Earth Remote Sensing, Photogrammetry, Surveying and Global Navigation Satellite Systems. He has taken part in several internships at academic institutions in Hungary, Poland, Germany and Iceland. His Ph.D. thesis is focused on research of river systems using UAV photogrammetry methods.

The Influence of the Distribution and Amount of Ground Control Points on the Accuracy of the Aerotriangulation Calculation

All geographical disciplines need to measure spatial data in the field. Research in fluvial geomorphology is almost fully dependent on field data observation. The integration of methods of geomorphology and geotechnologies brings effective benefits for many geosciences. The presentation aims to present applications of stereo photogrammetric techniques and procedures based on UAVs (Unmanned Aerial Vehicle) for geomorphological research of the Morava River meanders in the Litovelské Pomoraví area. The studied meander was taken by the UAV system in two stages: before and after destruction of the meander neck. The main results present the optimal techniques and methods for a very accurate data mining and optimizing the process of terrain investigation in the field.

Rostislav Nétek



Rostislav Nétek is a PhD student at Palacký University in Olomouc. His professional skills and interests are web cartography, geoinformation technologies and open source solutions. His dissertation research is focused on the implementation of RIA concepts for applications in crisis management. He completed internships at the Polytechnic University in Valencia and University La Molina in Peru in the last two years. He is a member of the ICA Commission on Cognitive Visualization.

The Impact of the Implementation of HTML5 Elements into WebGIS Applications

The previous era of internet cartography was based on robust server solutions. However, the present technologies enable a large replacement of interactive maps into the web browser environment. The presentation discusses the visualization and customization opportunities of Rich Internet Application (RIA) that new HTML5 standard and related technology brings to WebGIS. Two interactive web applications for the “Virtus” and “BotanGIS” projects based on this concept were developed and tested with the aim of enlarging specific user groups. The presentation describes the concept of map customization in regard to HTML5 for both Regional Nature Conversation (within the “Virtus” project) management and Botanical garden management necessities (within the “BotanGIS” project), originally on the same (server) platform. In addition to describing the process of the concept development, the presentation is closely focused on the RIA benefits analysis. The characteristics of “Virtus” and “BotanGIS” applications are compared with the standard solution in the case study, divided into three groups of aspects - visualization aspects (e.g. transparency, rounded borders, jQuery effects), technological aspects (e.g. caching services, cloud computing) and management aspects (e.g. plugins & widgets, additional functions, editing). The results of the tabular evaluations show that both applications bring great benefits and advantages due to the usage of HTML5.

Justyna Pastwa

Justyna Pastwa is a PhD student at Palacký University in Olomouc. Her interest focuses on spatial data analysis and open GIS software. Her dissertation thesis deals with applications of artificial neural network (ANN) models for spatial data analyses in research of landscape processes. She completed a short-term research internship at Eötvös Loránd University (Budapest) in 2011 Visualization.

Artificial Neural Network in Delimitation of Damaging Hydrological Event Susceptibility Zones from Registered Impacts

Poland suffers from frequent damaging hydrological events (DHE) – periods during which phenomena such as rainfall and floods cause damage to people and the human environment. The presentation introduces the applications of artificial neural network in the study of DHE susceptibility mapping from the registered data collected by the National Headquarters of the State Fire Service. As an example, the province of Dolnośląskie (a district consisting of 166 municipalities and populated by 2,877,840 inhabitants, 1,9947 km^2) was analyzed. The territory of Dolnośląskie was classified into five DHE susceptibility zones depicting exposure to the hazards or the likelihood of suffering damaging losses. The zones with moderate, high and very high grades of DHE susceptibility are in need of human activities to reduce the destructive effects of hydrological hazards.

Vít Pászto

Vít Pászto is a PhD student at Palacký University in Olomouc. His scientific interests cover issues such as modelling in GIS, spatial information, its evaluation and visualization using fuzzy logic, fractal measurements and entropy theory. His latest research includes spatial and shape metrics applied to a CLC dataset. He has undertaken several research internships (Hungary, Serbia, Great Britain) with the focus on the above mentioned issues.

Corine Land Cover dataset analysis with (geo)computational methods in GIS

The presentation describes spatial and shape metrics application for the analysis of Corine Land Cover (CLC) areas for the years 1990, 2000, and 2006. The statistical methods utilised in the analysis are also discussed. The overarching goal of the paper is to evaluate a CLC dataset without including attribute or qualitative information in the analysis. Thus, only the geometric part of the data was processed. Twenty seven metrics were used for more than 900 areas (polygons) from a CLC dataset.The values of the metrics were calculated and consequently used for a correlation analysis, a principal component analysis, a cluster analysis, and others. The results of the study represent a complex evaluation of CLC Level 1 classes using, fundamentally, only the shape of CLC areas (polygons).

Stanislav Popelka

Stanislav Popelka is a PHD student at Department of geoinformatics, Palacký University in Olomouc. His thesis is focused on the evaluation of various visualization techniques by eye-tracking system. The main objectives of his research are the analyses of cartographic methods for visualization of three-dimensional data. He is a member of ICA Commission on Cognitive Visualization.

Space-Time-Cube for Visualization of Eye-tracking data

Maps can be evaluated from many perspectives. One of the most objective methods of evaluation of map use is an analysis of a map reader's eye movements, known as eye-tracking. The presentation introduces the spatio-temporal visualization method called Space-Time-Cube, which displays the map at the base of the cube (axes X and Y) and the Z axis is used to represent time. Space-Time-Cube was used for visual analysis of eye-tracking data, measured during the testing of reading of maps from school atlases.The goal of the case study was to answer questions related to the map legend.A total of 16 test subjects were engaged for the test and respondents were selected from two groups - cartographers and non-cartographers. The results suggest that both groups of respondents used the map legend automatically and they looked at the legend before finding an answer in the map. The beginning of scanpath (trajectory of an eye) is almost similar within the first two seconds of stimuli presentation. With the use of Space-Time-Cube, spatial and temporal components of the map are shown together, and the relationship between space and time can be revealed. With the use of traditional methods of eye-tracking data visualization (Gazeplot and HeatMap), these relationships remained hidden.

Petra Sádovská

Petra Sádovská is a PhD student of Geoinformatics & Cartography at Palacký University in Olomouc. Her research is focused on monitoring the movement of people in real-time. She completed a short-term research internship at Salzburg University in May 2012.

Real-Time Monitoring of the Movement of Young People Using the Location-Based Social Network

The presentation is aimed at the use of the Location-based Social Network (LBSN) for monitoring the movement of young people in Olomouc city. In the case study the most vibrant LBSN Foursquare (LBSN website for mobile devices, such as smartphones) is applied. The users check in at the place they are situated in real-time and where they can share information about location with their friends. The data about the users' locations are visualized in GIS as layers of user movement and then compared to a layer of the functional structure of the city of Olomouc. Combining these layers can better determine where people spend their time during the day. The experiment is part of the complex research based on the use of the Location-based Social Network for urban analysis.

Aleš Vávra

Aleš Vávra is a PhD student of Geoinformatics & Cartography in the Department of Geoinformatics, Palacký University in Olomouc. He is focused on digital cartography, advanced visualization and spatial modelling. He also has experience with the creation of e-learning systems from the project „Educational model of e-learning in selected branches of the environment“. He was involved with the team that produced the Atlas of phenological conditions of Czechia. He has been on several internships at universities in Poland, Italy and Iceland.

Phenological Observation Treatment in the Landspace Mapping of the Vysoké Pole Experimental Site

The suitability of selected cartographic methods and their applications significantly affect the user's ability to gain quick access to the correct information. The presentation is focused on a comprehensive approach to phenological mapping of the landscape and integration with other technologies of data collection. The aim of the research is to verify in a practical way the integration of several methods of data capturing in the study of the heterogeneity of the landscape. These methods include: 1) remote sensing of landscape provided by unmanned aerial vehicle, 2) monitoring of abiotic factors by sensor network, 3) observations of phenological stages of wild plants and 4) analysis of laser-scanning models of the site. The studied area is the Vysoké Pole experimental site where phenological activities are observed over several different periods. The observation was compared to results from small-format photographing and from sensor network monitoring. All results were integrated for further analyses. The final results in the form of static time series and trends of selected biotic factors (for example biomass, chlorophyll, foliage area) are being prepared for predictive modelling of phenological conditions of the studied area. The expected results of observations show the different conditions in the development of vegetation on sites caused by elevation, slope, aspects or terrain topography.

Alena Vondráková

Alena Vondráková is a PhD student of Geoinformatics and Cartography at Palacký University Olomouc. She focuses her research on thematic cartography, with an emphasis on the user aspects of maps and the legislative protection of cartographic products. The dissertation thesis addresses the non-technological aspects of map compilation in atlas cartography and the evaluation aspects of map production and map use. Her methods of cartographic research include the technology of eye-tracking and the psychological evaluation of users' perception of maps.

The influence of applied cartographic methods on the map information perception: quantification for various groups of users

The suitability of selected cartographic methods and their applications significantly affect a user's ability to gain quick access to the correct information from a map. The author has researched the influence quantification of applied cartographic methods on the map information perception by various groups of users (distributed by age and education). Tests with eye-tracking tools have shown that incorrectly chosen or incorrectly applied cartographic methods can adversely affect the user's perception of information from a map. The users studied a series of maps completed by different cartographic methods from the same dataset while the accuracy and speed of their responses to questions were measured as the evaluation criterion. The results identify the cartographic methods that are suitable for the presentation of certain data (qualitative and quantitative) to specific groups of users and for a defined purpose.

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http://www.geoinformatics.upol.cz/app/indog/

The conference is supported by ESF project
“Innovation of PhD Geoinformatics and cartography study with support of modern technological trends”
OPVK: CZ.1.07/2.2.00/28.0078

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INVESTMENTS IN EDUCATION DEVELOPMENT